STAFF REPORT

USING THE ISUMODEL REMOTE ACCESS SYSTEM

ESCS Staff Report NRED 80-1

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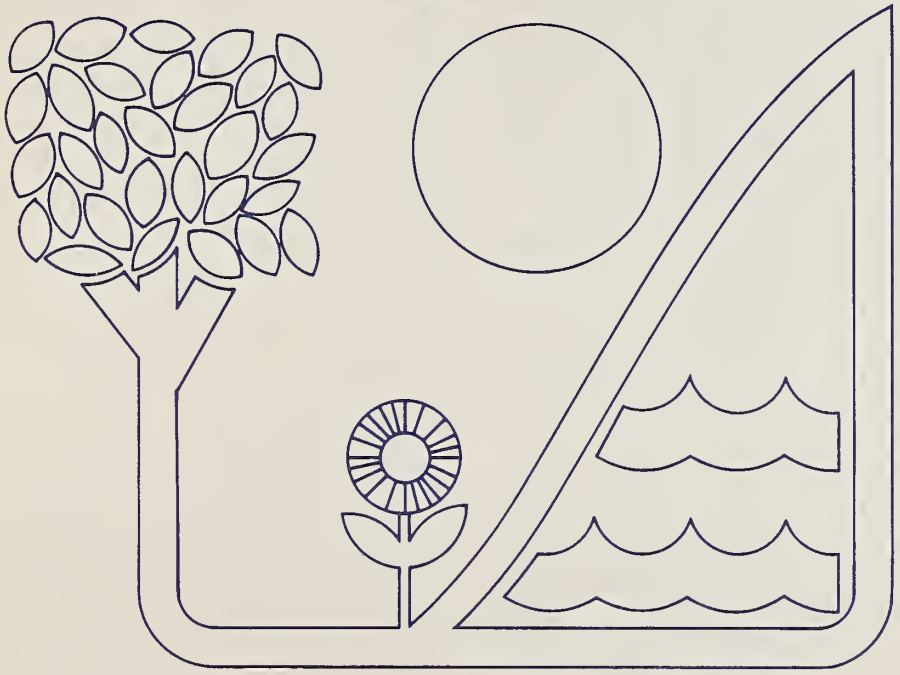
Klaus Alt

NRE
Economics, Statistics, and Cooperatives Service
United States Department of Agriculture



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Washington, D.C. 20250

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ABSTRACT

This paper describes an interactive computer program which allows direct access to one version of the National Linear programming models on line at the Iowa State University computer. The user can enter changes in crop yields or production costs and obtain a solution to the revised model with a summary which can be printed at his remote terminal. The system lends itself to quick studies of the impact of exogenous changes in crop production possibilities, such as impacts of droughts, restraints on fertilizers or pesticides and the like.

Key words: National linear programming models, Impact studies.

ACKNOWLEDGEMENTS

Professor Earl O. Heady, working with many associates over the past decades, guided the evolution and development of the "ISU national linear programming model." The model used as the basis for this system was built over the past year with the very necessary and able assistance of William G. Boggess, Research Economist, and Elaine B. White and Paula L. Carter, Research Associates (Programmer-Analyst) with the Center for Agricultural and Rural Development (CARD), Iowa State University.

CONTENTS

INTRODUCTION

The national agricultural sector linear programming model built by NRED in close cooperation with CARD[1/] has proven useful in many types of analyses relating to agricultural resource, institutional and environmental policies. Heady, et al., have written extensively over the years on analyses conducted using this model's ancestors as their analytical tool. Its use in studying environmental policies and impacts is becoming increasingly important as environmental-economic relationships and feedbacks become even more detailed and complex. The impetus for devising the "Remote Access System" was the responsibility assigned NRED to analyze the effects of EPA (Environmental Protection Agency) pesticide bans on various aspects of the agricultural sector.

While the model is nothing more than a standard (even classic) linear programming model, larger than most, it requires many data from diverse sources, development and management, complex computer software routines for data processing and model summarizing and a thorough understanding of agricultural production practices. While its size and complexity are necessary evils in order to more nearly approach realism, they represent its major shortcomings and severely hamper its usefulness. To learn to run and analyze the model requires a multi-year stint in Ames. The model's worth as an analytical tool is unlimited while access is quite limited.

[1/] It is actually a descendent of earlier CARD models, e.g., the National Assessment Model (Meister and Nicol) or the National Commission on Water Quality Model (T-40).

The ISUMODEL Remote Access System was developed to allow widespread access to the model in Ames from remote locations by those unfamiliar with computer processes. The ISU computer can be accessed from a remote telephone-type terminal, model revisions entered and results obtained. The model was initially set up to analyze production cost and yield changes (due to EPA inspired changes in pesticide use) and their impact on production patterns and land use for NRED's Pesticide Impact Group.

The following section discusses some of the salient features of the LP model used in the ISUMODEL Remote Access System. The second section describes the Remote Access software itself and its interactive relationships with the LP model. Next, the procedure used to set up and run the model is described, and finally an actual example is given showing the procedure used to run the model.

MODEL DESCRIPTION

ISUMODEL is an example of one of several statistical-mathematical techniques developed over the years to analyze various segments of the agricultural economy. Its central component is a linear programming model that can analyze alternative crop production patterns in spatially segregated areas of the country. This model traces its origins to work initiated over two decades ago by Iowa State University Professor Earl O. Heady. Since that time Heady and his associates have continued to revise the model with improved data sources and data processing techniques and in expanded scope of application.[2/]

[2/] Heady, Earl O. and Uma K. Srivastava, Spatial Sector Programming Models in Agriculture, Iowa State University Press, Ames, 1975.

In 1973, Iowa State's Center for Agricultural and Rural Development, which Heady directs, was asked to prepare, in cooperation with the Natural Resources Economics Division, a model to analyze agricultural resource use for the Water Resources Council's 1975 National Water Assessment. The model used in the National Water Assessment has been described by Meister and Nicol.[3/] Since the National Assessment runs were made, a scaled-down version of the model was developed for ESCS use. This reduced version is less costly to solve and provides an analytic structure quite adequate for current needs.

MODEL STRUCTURE

As mentioned, the heart of ISUMODEL is the interregional agricultural sector model developed at Iowa State University. This model is a cost minimization linear programming formulation. Model solutions represent a farm level competitive equilibrium in the production and distribution of the crops endogenous to it.[4/] In addition, soil loss associated with the production of the endogenous crops can be calculated at the regional level. The production and distribution of the remaining crops[5/] --

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[3/] Meister, Anton D. and Kenneth J. Nicol, "A Documentation of the National Water Assessment Model of Regional Agricultural Production, Land and Water Use, and Environmental Interaction," Miscellaneous Report, Center for Agricultural and Rural Development, Iowa State University, Ames, Iowa, Dec. 1975.

[4/] Barley, corn, cotton, hay, oats, silage, sorghum, soybeans, and wheat.

[5/] Rye, rice, fruits, nuts, vegetables, flaxseed, peanuts, sugarcane, sugar beets, tobacco, potatoes (Irish and sweet), dry beans, dry peas, and other crops.

generally those which are raised in restricted areas of the country -- and livestock are projected by NEAD's NIRAP projection system.

To depict agricultural regionalization, the 48 contiguous states are divided into the 105 hydrologic areas (Aggregated Subareas or ASAs) defined for the National Water Assessment.[6/] At this level, crop production activities are defined using up to 330 alternative crop rotations in each ASA. The 58 westernmost ASAs are defined to include irrigation as an alternative production activity. The 105 ASAs are aggregated into 28 market regions within which regional demands and among which commodity transportation activities are defined. In each ASA the quantity of total arable land is estimated for each of five land classes (qualities). Each land class represents a unique crop yield, production cost, and soil loss in each ASA.

When the model is solved, the results indicate the least cost method and location of meeting the nation's primary food and natural fiber requirements as projected for a future time period. Model results are normative in nature and as such do not predict actual future conditions. The results are entirely dependent on assumed relationships and must be analyzed in a "with or without" rather than a "present v. future" context. This feature makes this type of model particularly effective for agricultural, environmental, and resource policy analysis. The impact of postulated policies can be determined in isolation without the vagaries presented by the influence of time or other variables.

[6/] The Water Resources Council defined 99 ASAs but 6 ASAs in the Great Plains were divided to reflect local resource differentials.

APPLICATIONS

The agricultural-environmental adjustments which could be analyzed by ISUMODEL are endless. This section lists some of the resource questions addressed and some which remain to be addressed, either because of lack of research resources, time, or usable data. The list is far from exhaustive but gives an idea of the flexibility of ISUMODEL.

Physical Resource Adjustments

ISUMODEL can be used to determine impacts on the agricultural sector resulting from variations in the physical environment. Most of these variations are related to resource shortages, for example, shortage of ground or surface water because of drought. Another example is shortage of arable land when the agricultural sector competes for space with other economic sectors.

Other possibilities of analyzing physical aspects of resource use concern variations in weather or climate. Such factors as timeliness and intensity of rainfall, temperature variations, and other weather-related variables can have a significant impact on the performance of the agricultural sector. Commodity yield or quality variations in any region of the country affects, through links and feedbacks, every other region. ISUMODEL can be formulated to investigate these and many other types of questions.

Institutional Resource Adjustments

Agricultural and resource policy decisions have wide-ranging implications for the entire economy. The impacts are felt throughout the

nation because of the intricate interrelationships with which the economy is structured. ISUMODEL can analyze the impacts of these policies and provide valuable insight to policy makers.

Heady and Srivastava[7/] point out several institutional adjustments which have been studied over the years by models preceeding ISUMODEL. These include the impacts of land retirement, supply control, and excess capacity policies (in the heyday of the farm programs). Other studies include the effects of changes in exports and other demands, changes in production technology, production and commodity transportation costs, and the effect of farm programs on income and employment. This system has also been utilized to determine the value of natural resources as production inputs under various policy options.

One of the most important applications of the LP model has been in analyzing impacts on the agricultural sector of policies intended to support environmental enhancement. Agriculture is a most significant polluter of the environment and any policies designed to enhance the environment will have a dramatic impact upon the entire agricultural sector. ISUMODEL's predecessors have been utilized to analyze the impacts of many of these policies. For instance, some of the runs of the National Water Assessment[8/] focused on restrictions of soil loss, wet soils development, livestock waste disposal, and irrigation water use because of preemptory needs for wildlife enhancement or energy resource development.

[7/] ibid.

[8/] Meister, Anton O., Earl O. Heady, Kenneth J. Nicol, and Roger W. Strohbehn, "U.S. Agricultural Production in Relation to Alternative Water, Environmental, and Export Policies," CARD Report 65, Center for Agricultural and Rural Development, Iowa State University, 1976.

Wade and Heady[9/] used this system to analyze the effect of resource and environmental policies on stream sediment load. Other applications include the effect of specific pesticide bans or overall restrictions on agricultural chemicals including pesticides and plant nutrients. Model developments in the area of environmental policy impacts are restricted only by the availability of scientific and technical information which provide insight into the relationships between the agricultural sector and the environment and the institutional policies which are promulgated to enhance both. An example of such needed information is the technological relationship between agricultural chemicals used and the quantities found as downstream water pollutants.

These represent a few of the physical and institutional resource issues which could be dealt with by ISUMODEL. The list presented above is by no means exhaustive; the questions which can be addressed by this system are limited only by the times, the model builders' skills, or the users' imagination. A caveat is in order. This system is not the policy makers' panacea. The limitations of mathematical modeling, linear programming, and problem formulation are numerous and well-documented. It is impossible to model the real world exactly, except, possibly, by using the real world itself. If, however, the system is utilized with care, it can be an invaluable aid to those charged with the social responsibility of keeping hunger and environment in balance.

[9/] Wade, James, C. and Earl O. Heady, "A National Model of Sediment and Water Quality: Various Impacts on American Agriculture," CARD Report 67, Center for Agricultural and Rural Development, Iowa State University, 1976.

ISUMODEL PROCESSING PROCEDURE

The ISUMODEL Remote Access System is a series of software routines written in the interactive, time-sharing language WYLBUR (Stanford University). WYLBUR is quite useful for text editing and for writing and submitting computer programs (in such languages as Fortran and PL/1). Working in a conversational environment WYLBUR interacts with the user at the terminal and, by prompting, obtains the requsite data and automatically writes and submits the necessary (PL/1 and MPSX) computer programs to the operating system for processing. After a suitable time interval[10/] the user again connects with WYLBUR to "fetch" the results and list them on his/her terminal.

The original version of ISUMODEL is set up to analyze EPA-inspired changes in crop yields and production costs by state. WYLBUR asks the user for these adjustments for each crop by state. When all data have been entered WYLBUR writes and submits the program necessary for developing a net set of crop rotations. The revised crop rotation data set is then input, along with the remaining LP data, into the MPSX routine. In ISUMODEL's fifth step, a solution-sort/report-writing program is run to obtain optimal values of the pertinent variables by Water Resources Council's aggregated subarea (ASA). Step 6 takes the sorted solution data, converts them to state levels using a method weighted averages,

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[10/] At the ISU computation center, the availability of drives for private, mountable disk packs represent the main bottleneck in running large LP models. ISUMODEL requires two of NRED's private packs, one public scratch pack and one tape. Depending on job load, ISUMODEL may not run until late at night.

compares them to a solution of the "base" model, and develops the output format. When step 6 is completed, the user then executes the final phase of ISUMODEL, namely a WYLBUR program which accesses and lists the results of the user's terminal.

The actual step-by-step procedure used in running ISUMODEL is presented in the next section. The final section illustrates the procedure using an actual example.

Before connecting with IUS's computer, it is preferable to set up the input data beforehand on a worksheet such as that portrayed in Figure 1. The data required are state code number, crop code number, yield change (ratio), and production cost change (dollars per acre). Setting up the data beforehand will facilitate processing while working on the terminal.

Computer acess

Financial arrangements must be negotiated with ISU to obtain a computer account. This can be done through NRED, ESCS. The account number and the user-designated account key are required for time-sharing sign on.

Access to ISUMODEL is accomplished by the following procedure:

1. Connect with ISU time-sharing:
    a. dial 515-294-9500 or FTS 865-9500
    b. connect phone to terminal
    c. type proper access code (usually the letter "O") followed by carriage return; if this doesn't work consult the ISU User's Reference Memo reproduced in the appendix.

Figure 1. Sample worksheet

State		Crop Number	Yield Ratio	Cost Change
Name	Number			

2. Enter accounting information when prompted:

   a. ACCOUNT? This is the 5-digit ISU account number. It is in the form: Uxxxx

   b. NAME? This is the name of the user. The Pesticide Impact Group uses the name PST.

   c. KEY? This is a 2-symbol code intended to prevent unauthorized use of an account.

3. Upon proper response to the above promptings, WYLBUR will ask: COMMAND? to which the response is:

   "EXECUTE FROM ISUMODEL"

   This command will cause WYLBUR to assume control of the terminal and begin executing ISUMODEL. ISUMODEL then begins prompting the user for the proper input to execute the LP system.

Model execution

When ISUMODEL is executed, the first response required of the user will be:

"DO YOU WANT A LIST OF THE CROP CODES?"

A "YES" will list the crop names and code numbers required for ISUMODEL input. Following this, the prompt will appear:

"DO YOU WANT A LIST OF THE STATES:" (Table 1)

A "YES" will list the states and their (USDA) code numbers. The third user request will be for a run title; this will help the user identify his output results. Every run should be labeled differently; note that the title must not contain quotes.

Table 1. Crops defined by state

State	USDA State Code	Barley	Corn	Corn Silage	Cotton	Legume Hay	Nonlegume Hay	Oats	Sorghum	Sorghum Silage	Soybeans	Wheat
Alabama	32		x	x	x	x	x	x			x	x
Arizona	43	x		x	x	x	x	x	x	x		x
Arkansas	34	x	x	x	x	x	x	x	x	x	x	x
California	48	x	x	x	x	x	x	x	x	x		x
Colorado	41	x	x	x		x	x	x	x	x	x	x
Connecticut	6		x	x		x	x	x				
Delaware	10	x	x	x		x	x	x			x	x
Florida	31		x	x	x	x	x	x			x	x
Georgia	30		x	x	x	x	x	x			x	x
Idaho	39	x	x	x		x	x	x				x
Illinois	17	x	x	x		x	x	x	x		x	x
Indiana	16	x	x	x		x	x	x	x		x	x
Iowa	18	x	x	x		x	x	x	x	x	x	x
Kansas	23	x	x	x	x	x	x	x	x	x	x	x
Kentucky	27	x	x	x	x	x	x	x	x	x	x	x
Louisiana	35		x	x	x	x	x	x	x	x	x	x
Maine	1		x	x		x	x	x				
Maryland	11	x	x	x		x	x	x			x	x
Massachuetts	4		x	x		x	x	x				
Michigan	12	x	x	x		x	x	x			x	x
Minnesota	14	x	x	x		x	x	x	x	x	x	x
Mississippi	33		x	x	x	x	x	x	x	x	x	x
Missouri	19	x	x	x	x	x	x	x	x	x	x	x
Montana	38	x		x		x	x	x		x		x
Nebraska	22	x	x	x		x	x	x	x	x	x	x
Nevada	45	x			x	x	x	x	x			x
New Hampshire	2		x	x		x	x	x				
New Jersey	8	x	x	x		x	x	x			x	x
New Mexico	42	x	x	x	x	x	x	x	x	x	x	x
New York	7	x	x	x		x	x	x			x	x
North Carolina	26	x	x	x	x	x	x	x	x		x	x
North Dakota	20	x	x	x		x	x	x	x	x	x	x
Ohio	15	x	x	x		x	x	x			x	x
Oklahoma	36	x	x	x	x	x	x	x	x	x	x	x
Oregon	47	x	x	x		x	x	x				x
Pennsylvania	9	x	x	x		x	x	x			x	x
Rhode Island	5			x		x	x					
South Carolina	29	x	x	x	x	x	x	x	x		x	x
South Dakota	21	x	x	x		x	x	x		x	x	x
Tennessee	28	x	x	x	x	x	x	x	x	x	x	x
Texas	37	x	x	x	x	x	x	x	x	x	x	x
Utah	44	x		x	x	x	x	x	x			x
Vermont	3		x	x		x	x	x				x
Virginia	24	x	x	x	x	x	x	x			x	x
Washington	46	x	x	x		x	x	x				x
West Virginia	25	x	x	x		x	x	x			x	x
Wisconsin	13	x	x	x		x	x	x	x		x	x
Wyoming	40	x	x	x		x	x	x		x		x

ISUMODEL is now prepared to accept the input data necessary for revising the LP. The user is prompted for the state number, crop number, yield change,[11/] and cost change. When all data have been entered the user enters

"DONE"

when asked for the state number following the entry of his final data. As an example, in an analysis, if wheat and barley in Montana were expected to change in yield by -3 percent and in cost by + $2.36 per acre the entries required are these:

```
STATE NUMBER?    38
CROP NUMBER?      1
YIELD CHANGE?   .97
COST CHANGE?   2.36
STATE NUMBER?    38
CROP NUMBER?     11
YIELD CHANGE?   .97
COST CHANGE?   2.36
STATE NUMBER?  DONE
```

At this point ISUMODEL will list all data entered in tabular format:

	STATE NO.	CROP NO.	YIELD CHANGE	COST CHANGE
1.	38	1	.97	2.36
2.	38	11	.97	2.36

[11/] To avoid confusion, remember that for yield change, ISUMODEL wants a ratio (in decimal form) of the expected relative yield with respect to original yield.

It will then ask:

"IS EVERYTHING OK?"

At this point the user should check the above table carefully for erroneous data entry. If nothing is amiss the entry of "YES" will submit this analysis for batch processing. A "NO" response will prompt the query:

"WHICH ROW NUMBER IS IN ERROR?"

At this point the user again enters the four data items for the row in question and ISUMODEL lists the entire data table once more, including the corrected row[12] and the question is again asked:

"IS EVERYTHING OK?"

The consequences are the same as previously; "YES" submits the job to the operating system, "NO" repeats the correction process for another row number.

Computer processing

Upon completion of the data entry phase ISUMODEL submits a series of six separate jobs to the operating system for processing. These are labeled "EH72STP1"[13] through "EH72STP6." Step 1 modifies the yield and cost files according to the data submitted by the user and step 2 uses the revised cost and yield data sets to run the matrix (rotations) generator. This software develops new or revised rotations (cropping

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[12] If several errors are made the correcting process is repeated including the listing of the complete table. This can be quite time consuming so it is helpful if care is taken when entering the original data. The complete table is listed so that the user has a record of data input for all ISUMODEL analyses.

[13] EH(East Hall)72 is the NRED computer output box number at Ames.

activities in MPSX format) as dictated by the cost and yield changes. Step 2 modifies and corrects the rotations. Job step 3 combines (concatenates) the revised rotations data with the remaining MPSX data sets (rows, columns, right hand sides, bounds) required by the LP model. Step 4 is the MPSX program. Steps 5 and 6 are summarizing programs and report writers. Step 5 summarizes the optimal solutions obtained from this analysis and step 6 compares this run with the solution of the base model, formats the results, and prepares the output for listing.

Obtaining results

When the six jobs have been submitted, ISUMODEL signs off and disconnects the user's terminal from ISU time-sharing. Processing will normally take several hours during the day so waiting on line for the results is pointless. The lengthy turnaround time for ISUMODEL results from the complex processes involved in the six jobs,[14/] time spent awaiting setup (disks and tapes),[15/] and the handling of large data sets.

To determine whether ISUMODEL has completed processing the user signs on as usual and when the computer asks, "COMMAND," the user enters:

"LOCATE EH72STP6"

The computer can respond in several ways, for example:

"JOB XXX EH72EH72STP6 AWAITING SETUP"

"JOB XXXX EH72STP6 EXECUTING"

[14/] The MPSX step is set up with a limit of 35 minutes of central processing unit time. This, along with requiring two mountable disks assures that step 4 will receive a low priority in the job queue.

[15/] One hundred twenty-five private packs compete for 3 (or fewer) disk drives.

In this case, the user should logoff and wait.

The message:

"JOB XXXX EH72STP6 AWAITING FET (FETCH)"

indicates that step 6 (and the other 5) has completed processing. Then the user should enter:

"EXECUTE FROM RESULTS"

This will cause ISUMODEL to retrieve the results and list them on the user's terminal. If, after the header is listed, no results appear, then step 6 -- or one of its predecessors -- has bombed for reasons beyond the control of the user (assuming that the data were entered correctly). When (if) this happens the user should check the following section regarding errors.

Interpretation

ISUMODEL output is presented in tabular form designed to facilitate slow (30 characters per second) terminal listing capabilities. For the analysis, percentage changes between the optimal solution of the user's run and that of a base run are listed by state for each of four variables. These include crop production, crop acreage, yield per acre, and production cost per acre. For informational purposes, the estimated Statistical Reporting Service values for 1976, and the 1985 NIRAP[16/] projections are presented for the first three variables. States and/or crops experiencing no change in these four variables are not listed.

Errors

Errors in the operation of ISUMODEL will normally not be the fault

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16/ National Interregional Agricultural Projections prepared by NEAD, ESCS.

of the user. If the user exhibits due care in the preparation and entry of his data then any errors are the fault of the system's designer(s) A call to Ames should remedy errors of this type. The following discussion details user response to computer pratfalls.

Erroneous data entry, noticed early, can be corrected according to the procedure outlined above in the discussion of data entry. If a datum has been typed but not entered (that is, the RETURN key has not been depressed) the user can backspace over the item and retype it. If the user discovers that something is amiss prior to submitting his data (before answering "YES" to the query "IS EVERYTHING OK?") he can start the process over by depressing the BREAK key two or three times. The computer will respond with:

"EXEC BREAK"

"COMMAND?

to which the user responds:

"EXECUTE FROM ISUMODEL CLEAR"

If the user instead wants to terminate the session at this point he enters:

"LOGOFF CLEAR"

This will disconnect the terminal from time-sharing.

If the user discovers for some reason he wishes to stop the process after the six jobs are submitted, it's time to call Ames again so that personnel there can cancel job execution.

Sometimes while using time-sharing, this or an equivalent message will appear:

"SYSTEM GOING DOWN FOR IMMEDIATE RELOAD, LOGOFF IMMEDIATELY"

The response in this case is obvious; hit BREAK and enter:

"LOGOFF CLEAR"

EXAMPLE

NRED's Pesticide Impact Group provided the figures used for this example. These figures represent the estimated impact on cotton yield and cost in various states because of a proposed ban on the chemical toxaphene. Figure 2 shows the original input data entered into ISUMODEL. Following this, a listing of the prompts and responses resulting from executing both ISUMODEL and RESULTS is shown.

Figure 2. Example

State		Crop	Yield	Cost
Name	Number	Number	Ratio	Change
AL	32	4	0.988	2.83
AZ	43	4	0.999	-0.79
AR	34	4	1.0	0.46
GA	30	4	0.997	2.59
MS	33	4	0.814	8.30
NC	36	4	0.818	5.30
SC	39	4	0.916	-16.75
TX	37	4	0.984	4.30

```
h        0


ISU LINE 17 14:52:17 05/24/78

ACCOUNT? U3657
NAME? FEST
KEY? ***
SYSTEM? WYLBUR
COMMAND? EXECUTE FROM ISUMODEL
->      1.     SET EXEC TER NOL



    UU         UU   SSSSSSSSSS   DDDDDDDDD      AAAAAAAAAA
    UU         UU  SSSSSSSSSSSS  DDDDDDDDDD    AAAAAAAAAAAA
    UU         UU  SS         SS  DD        DD   AA         AA
    UU         UU  SS             DD         DD  AA         AA
    UU         UU  SSS            DD         DD  AA         AA
    UU         UU   SSSSSSSSS     DD         DD  AAAAAAAAAAAA
    UU         UU    SSSSSSSSS    DD         DD  AAAAAAAAAAAA
    UU         UU            SSS  DD         DD  AA         AA
    UU         UU              SS  DD         DD  AA         AA
    UU         UU  SS         SS  DD        DD   AA         AA
    UUUUUUUUUUUU  SSSSSSSSSSSS  DDDDDDDDDD    AA         AA
     UUUUUUUUUU    SSSSSSSSSS   DDDDDDDDD     AA         AA


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          UNITED STATES DEPARTMENT OF AGRICULTURE
       ECONOMICS, STATISTICS, AND COOPERATIVES SERVICE
            NATURAL RESOURCES ECONOMICS DIVISION
          RESOURCE SYSTEMS AND PROGRAM ANALYSIS


                    HOWARD C. HOGG, BOSS
                  REUBEN N. WEISZ, RAMROD


HELLO,

WELCOME TO RS&PA'S SECTORAL MODEL ACCESS SYSTEM.  THIS SYSTEM
ALLOWS THE USER TO ACCESS AND RUN THE ISU AGRICULTURAL SECTOR
MODEL IN AMES FROM REMOTE LOCATIONS USING AN INTERACTIVE TIME
SHARING SYSTEM.

IF DIFFICULTIES ARE ENCOUNTERED PLEASE CONTACT THE BOSS;
PLAUDITS MAY BE SENT TO THE AMES OFFICE, RS&PA.
```

```
DO YOU WANT A LIST OF THE CROP CODES?     NO

DO YOU WANT A LIST OF THE STATES?     NO

TITLE OF THIS RUN (34 CHARACTERS MAX):     *** TOXAPHENE BAN ON COTTON ***

P.U3657.TITLE.HEADER REPLACED AND RECATLG'D ON SHORT1

NOW ENTER YOUR DATA.  WHEN PROMPTED ENTER THE STATE CODE
NUMBER, CROP CODE NUMBER, YIELD INDEX, AND PRODUCTION
COST CHANGE.

WHEN FINISHED ENTER "DONE" WHEN ASKED FOR THE STATE NUMBER.

STATE NUMBER:     32

CROP NUMBER:     4

YIELD CHANGE (RATIO):     .988

COST CHANGE (DOLLARS):     2.23

STATE NUMBER:     43

CROP NUMBER:     4

YIELD CHANGE (RATIO):     .999

COST CHANGE (DOLLARS):     -.79

STATE NUMBER:     34

CROP NUMBER:     4

YIELD CHANGE (RATIO):     1.

COST CHANGE (DOLLARS):     .46

STATE NUMBER:     30

CROP NUMBER:     6

YIELD CHANGE (RATIO):     .922

COST CHANGE (DOLLARS):     2.59

STATE NUMBER:     33

CROP NUMBER:     4

YIELD CHANGE (RATIO):     .922

COST CHANGE (DOLLARS):     8.3

STATE NUMBER:     26

CROP NUMBER:     4

YIELD CHANGE (RATIO):     .818

COST CHANGE (DOLLARS):     5.3
```

YIELD CHANGE (RATIO): .916

COST CHANGE (DOLLARS): -16.25

STATE NUMBER: 37

CROP NUMBER: 4

YIELD CHANGE (RATIO): 9984

COST CHANGE (DOLLARS): 4.3

STATE NUMBER: DONE

LETS REVIEW YOUR DATA:

	STATE NO.	CROP NO.	YIELD CHANGE	COST CHANGE
1.	32	4	.988	2.23
2.	43	4	.999	-.79
3.	34	4	1.	.46
4.	30	6	.922	2.59
5.	33	4	.922	8.3
6.	26	4	.818	5.3
7.	29	4	.916	-16.25
8.	37	4	.984	4.3

IS EVERYTHING OK? NO

WHICH LINE IS IN ERROR? 4

ENTER THE CORRECT DATA:

STATE NUMBER: 30

CROP NUMBER: 4

YIELD CHANGE (RATIO): .922

COST CHANGE (DOLLARS): 2.59

1.	32	4	.988	2.23
2.	43	4	.999	-.79
3.	34	4	1.	.46
4.	30	4	.922	2.59
5.	33	4	.922	8.3
6.	26	4	.818	5.3
7.	29	4	.916	-16.25
8.	37	4	.984	4.3

IS EVERYTHING OK? NO

WHICH LINE IS IN ERROR? 5

ENTER THE CORRECT DATA:

STATE NUMBER: 33

CROP NUMBER: 4

COST CHANGE (DOLLARS)? 8.5

1.	32	4	.988	2.23
2.	43	4	.999	-.79
3.	34	4	1.	.46
4.	30	4	.922	2.59
5.	33	4	.814	8.3
6.	26	4	.818	5.3
7.	29	4	.916	-16.25
8.	37	4	.984	4.3

IS EVERYTHING OK? TES

"YES" OR "NO" PLEASE!!!
IS EVERYTHING OK? YES

EVERYTHING SHOULD BE IN ORDER.
WE'RE READY TO RUN THE MODEL NOW.

****
STEP 1: RUN YIELD AND COST PROGRAMS

JOB 820 EH72STP1 AWAITING R/I PRIO 11
****
STEP 2: DEVELOP NEW ROTATIONS...

JOB 821 EH72STP2 IN R/I PRIO 11
****
STEP 3: BUILD MPSX DATA SETS...

JOB 822 EH72STP3 IN R/I PRIO 11
****
STEP 4: RUN MPSX...

JOB 823 EH72STP4 IN R/I PRIO 11
****
STEP 5: RUN REPORT WRITER...

JOB 824 EH72STP5 IN R/I PRIO 11
****
STEP 6: RUN SENSITIVITY ANALYSIS...

JOB 825 EH72STP6 IN R/I PRIO 11 FETCH
****

YOUR RUN, '*** TOXAPHENE BAN ON COTTON ***', IS IN THE HOPPER...
WHEN YOU DETERMINE THAT IT HAS BEEN RUN SIGN ON WITH "EXECUTE FROM RESULTS CLEAR"; YOUR RESULTS WILL BE LISTED.

SIGNING OFF.....

UNIT/COST ELAPSED 00:09:32/$0.29, CPU 1.80 SECS/$0.18
UNIT/COST PAGE 0.59 HRS/$0.06, DISK 16/$0.02
WYLBUR TOTAL $0.55
ELAPSED TIME = 00:09:41
END OF SESSION
zmFoM?

```
h  0

ISU LINE 18 16:26:16 05/24/78

ACCOUNT? U3657
NAME? PSET
KEY? ■■■
SYSTEM? WYLBUR
COMMAND? LOCATE EH72STP6
JOB  825 EH72STP6 AWAITING FET  5  0 PRIO  5
COMMAND? EXECUTE FROM RESULTS
->    10,    SET EXEC TER NOL


        UNITED STATES DEPARTMENT OF AGRICULTURE
    ECONOMICS, STATISTICS, AND COOPERATIVES SERVICE
          NATURAL RESOURCES ECONOMICS DIVISION
          RESOURCE SYSTEMS AND PROGRAM ANALYSIS

              ISUMODEL SENSITIVITY ANALYSIS


JOB  825 EH72STP6 AWAITING FET  5  0 PRIO  5

'*** TOXAPHENE BAN ON COTTON ***'

*****************************************************

STATE  PENNSYLVANIA      % CHANGE    1976 SRS   1985 NIRAP
CROP   CORN (BU)
       PRODUCTION (000)    -0.27    103500.00     90611.43
       ACRES (000)         -0.32      1150.00      1024.60
       YIELD/ACRE          +0.05        90.00        88.43
       COST/ACRE           +0.07

CROP   SOYBEANS (CWT)
       PRODUCTION (000)    -3.50       730.78       827.31
       ACRES (000)         -3.47        42.00        43.93
       YIELD/ACRE           0.03        29.00        31.38
       COST/ACRE             NIL
```

CROP	NL HAY (TONS)			
	PRODUCTION (000)	+2.33	1908.00	2062.90
	ACRES (000)	+2.51	1060.00	1018.51
	YIELD/ACRE	-0.17	1.79	2.02
	COST/ACRE	-0.32		
STATE	MICHIGAN	% CHANGE	1976 SRS	1985 NIRAP
CROP	OATS (BU)			
	PRODUCTION (000)	NIL	19635.00	19477.27
	ACRES (000)	NIL	385.00	302.20
	YIELD/ACRE	NIL	51.00	64.45
	COST/ACRE	NIL		
STATE	WISCONSIN	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	NIL	148240.00	212997.31
	ACRES (000)	NIL	2180.00	2030.89
	YIELD/ACRE	NIL	68.00	104.87
	COST/ACRE	-0.03		
CROP	OATS (BU)			
	PRODUCTION (000)	-0.87	55040.00	77187.75
	ACRES (000)	-0.91	1280.00	1162.27
	YIELD/ACRE	+0.04	43.00	66.41
	COST/ACRE	-0.10		
CROP	WHEAT (BU)			
	PRODUCTION (000)	NIL	3238.00	1703.38
	ACRES (000)	-0.50	93.00	41.03
	YIELD/ACRE	+0.50	34.81	41.51
	COST/ACRE	+0.68		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.80	2006.36	4188.44
	ACRES (000)	+0.86	152.00	295.59
	YIELD/ACRE	-0.05	22.00	23.61
	COST/ACRE	NIL		
CROP	L HAY (TONS)			
	PRODUCTION (000)	NIL	6622.00	9510.39
	ACRES (000)	-0.04	3010.00	2636.22
	YIELD/ACRE	+0.04	2.19	3.60
	COST/ACRE	-0.01		
CROP	NI HAY (TONS)			
	PRODUCTION (000)	-0.02	1504.00	2204.39
	ACRES (000)	NIL	970.00	829.27
	YIELD/ACRE	-0.02	1.55	2.65

	COST/ACRE	-0.03		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	+0.08	11352.00	12686.98
	ACRES (000)	+0.09	1320.00	954.82
	YIELD/ACRE	-0.01	8.59	13.28
	COST/ACRE	-0.02		
STATE	MINNESOTA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	-0.06	330400.00	522646.75
	ACRES (000)	-0.05	5600.00	5083.33
	YIELD/ACRE	NIL	59.00	102.81
	COST/ACRE	-0.15		
CROP	SORGHUM (BU)			
	PRODUCTION (000)	NIL		
	ACRES (000)	NIL		
	YIELD/ACRE	NIL		
	COST/ACRE	NIL		
CROP	BARLEY (BU)			
	PRODUCTION (000)	-1.13	34830.00	42790.47
	ACRES (000)	-1.14	860.00	911.67
	YIELD/ACRE	+0.01	40.50	46.93
	COST/ACRE	-0.07		
CROP	OATS (BU)			
	PRODUCTION (000)	-0.19	92700.00	133455.43
	ACRES (000)	-0.17	2060.00	2199.47
	YIELD/ACRE	NIL	45.00	60.67
	COST/ACRE	-0.08		
CROP	WHEAT (BU)			
	PRODUCTION (000)	+0.31	130482.00	72706.81
	ACRES (000)	+0.28	4056.00	1875.25
	YIELD/ACRE	+0.02	32.17	38.77
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.20	38051.25	72393.00
	ACRES (000)	+0.19	3020.00	3938.47
	YIELD/ACRE	NIL	21.00	30.63
	COST/ACRE	NIL		
CROP	L HAY (TONS)			
	PRODUCTION (000)	NIL	4599.00	6467.12
	ACRES (000)	NIL	2190.00	1729.24
	YIELD/ACRE	NIL	2.09	3.73
	COST/ACRE	NIL		

CROP	NL HAY (TONS)			
	PRODUCTION (000)	-0.01	1166.00	1509.66
	ACRES (000)	NIL	1060.00	793.88
	YIELD/ACRE	-0.01	1.09	1.90
	COST/ACRE	-0.05		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	+0.77	10281.00	10397.28
	ACRES (000)	+0.72	1490.00	848.30
	YIELD/ACRE	+0.04	6.89	12.25
	COST/ACRE	-0.03		
STATE	OHIO	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	+0.52	395920.00	290016.75
	ACRES (000)	+0.52	3920.00	2889.52
	YIELD/ACRE	NIL	101.00	100.36
	COST/ACRE	-0.02		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-2.96	66000.00	46927.15
	ACRES (000)	-2.92	1650.00	1114.67
	YIELD/ACRE	-0.04	40.00	42.09
	COST/ACRE	+0.15		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-3.21	56158.89	63085.34
	ACRES (000)	-3.16	2880.00	3652.37
	YIELD/ACRE	-0.06	32.50	28.78
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	-4.06	1931.00	1810.34
	ACRES (000)	-4.70	990.00	863.58
	YIELD/ACRE	+0.66	1.95	2.09
	COST/ACRE	+0.51		
STATE	INDIANA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	-0.02	693000.00	614345.68
	ACRES (000)	-0.12	6300.00	5309.76
	YIELD/ACRE	+0.09	110.00	115.70
	COST/ACRE	-0.05		
CROP	BARLEY (BU)			
	PRODUCTION (000)	6.86	378.00	475.38
	ACRES (000)	-7.08	9.00	10.70
	YIELD/ACRE	+0.23	42.00	44.42

	COST/ACRE	+0.30		
CROP	OATS (BU)			
	PRODUCTION (000)	-0.06	10560.00	10820.68
	ACRES (000)	+2.27	220.00	166.33
	YIELD/ACRE	-2.29	48.00	65.05
	COST/ACRE	+0.16		
CROP	WHEAT (BU)			
	PRODUCTION (000)	+48.56	57600.00	55485.76
	ACRES (000)	+48.90	1600.00	1330.35
	YIELD/ACRE	-0.22	36.00	41.70
	COST/ACRE	+2.44		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+1.17	64942.72	80139.00
	ACRES (000)	+1.31	3280.00	4081.23
	YIELD/ACRE	-0.14	33.00	32.72
	COST/ACRE	+0.01		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+2.96	950.00	903.27
	ACRES (000)	+7.06	500.00	387.34
	YIELD/ACRE	-3.83	1.89	2.33
	COST/ACRE	-0.18		
STATE	ILLINOIS	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	+0.37	1250830.00	1177947.00
	ACRES (000)	+0.33	11690.00	9892.83
	YIELD/ACRE	+0.04	107.00	119.07
	COST/ACRE	+0.02		
CROP	BARLEY (BU)			
	PRODUCTION (000)	-0.76	520.00	675.09
	ACRES (000)	-0.73	13.00	15.06
	YIELD/ACRE	-0.03	40.00	44.80
	COST/ACRE	+0.16		
CROP	OATS (BU)			
	PRODUCTION (000)	-1.75	23780.00	25248.35
	ACRES (000)	-1.51	410.00	364.92
	YIELD/ACRE	-0.24	58.00	69.18
	COST/ACRE	-0.02		
CROP	WHEAT (BU)			
	PRODUCTION (000)	+22.17	72150.00	62320.26
	ACRES (000)	+22.45	1850.00	1412.43
	YIELD/ACRE	-0.23	39.00	44.12
	COST/ACRE	+2.74		

CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.32	145149.12	185119.00
	ACRES (000)	+0.41	7560.00	8903.90
	YIELD/ACRE	-0.08	32.00	34.65
	COST/ACRE	-0.01		
CROP	L. HAY (TONS)			
	PRODUCTION (000)	NIL	2584.00	2186.29
	ACRES (000)	-0.07	760.00	538.81
	YIELD/ACRE	+0.07	3.39	4.05
	COST/ACRE	NIL		
CROP	NL. HAY (TONS)			
	PRODUCTION (000)	+1.62	874.00	867.29
	ACRES (000)	+3.86	460.00	335.88
	YIELD/ACRE	-2.16	1.89	2.58
	COST/ACRE	-0.90		
STATE	IOWA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	+0.01	1147500.00	1322624.00
	ACRES (000)	+0.02	12750.00	11411.47
	YIELD/ACRE	-0.01	90.00	115.90
	COST/ACRE	NIL		
CROP	SORGHUM (BU)			
	PRODUCTION (000)	NIL	1690.00	5263.68
	ACRES (000)	NIL	26.00	56.90
	YIELD/ACRE	NIL	65.00	92.50
	COST/ACRE	NIL		
CROP	BARLEY (BU)			
	PRODUCTION (000)	NIL		76.08
	ACRES (000)	NIL		1.46
	YIELD/ACRE	NIL		51.79
	COST/ACRE	NIL		
CROP	OATS (BU)			
	PRODUCTION (000)	-5.40	87025.00	75745.06
	ACRES (000)	-5.40	1475.00	1244.73
	YIELD/ACRE	NIL	59.00	60.85
	COST/ACRE	NIL		
CROP	WHEAT (BU)			
	PRODUCTION (000)	NIL	2975.00	1246.38
	ACRES (000)	-0.32	85.00	34.21
	YIELD/ACRE	+0.32	35.00	36.42
	COST/ACRE	+0.45		

CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.84	122571.56	168985.68
	ACRES (000)	+0.90	6590.00	7737.54
	YIELD/ACRE	-0.05	31.00	36.40
	COST/ACRE	+0.01		
CROP	L HAY (TONS)			
	PRODUCTION (000)	NIL	5246.00	5541.08
	ACRES (000)	-0.24	1720.00	1388.21
	YIELD/ACRE	+0.24	3.04	3.99
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	-0.19	1408.00	1381.00
	ACRES (000)	NIL	640.00	490.86
	YIELD/ACRE	-0.19	2.19	2.81
	COST/ACRE	NIL		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	-0.02	12268.00	11448.59
	ACRES (000)	-0.06	983.00	645.78
	YIELD/ACRE	+0.03	23.50	17.72
	COST/ACRE	+0.02		
STATE	MISSOURI	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	-2.30	173850.00	251597.81
	ACRES (000)	-3.92	2850.00	2431.64
	YIELD/ACRE	+1.68	61.00	103.46
	COST/ACRE	+0.67		
CROP	OATS (BU)			
	PRODUCTION (000)	+13.40	6800.00	2849.48
	ACRES (000)	+17.11	170.00	61.08
	YIELD/ACRE	-3.17	40.00	46.64
	COST/ACRE	-0.95		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-1.08	54450.00	41546.77
	ACRES (000)	-1.05	1650.00	1153.65
	YIELD/ACRE	-0.02	33.00	36.01
	COST/ACRE	-0.05		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-0.12	50399.00	84803.25
	ACRES (000)	-0.08	4200.00	4526.18
	YIELD/ACRE	-0.03	20.00	31.22
	COST/ACRE	-0.02		
CROP	NL HAY (TONS)			

	PRODUCTION (000)	+0.98	3848.00	4294.76
	ACRES (000)	+1.16	2850.00	1969.19
	YIELD/ACRE	-0.17	1.35	2.18
	COST/ACRE	-0.11		
CROP	COTTON (BALES)			
	PRODUCTION (000)	-0.53	165.00	245.09
	ACRES (000)	NIL	255.00	229.66
	YIELD/ACRE	-0.53	.64	1.06
	COST/ACRE	+0.29		
STATE	NORTH DAKOTA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	NIL	7200.00	10873.38
	ACRES (000)	NIL	180.00	184.62
	YIELD/ACRE	NIL	40.00	58.89
	COST/ACRE	-0.06		
CROP	BARLEY (BU)			
	PRODUCTION (000)	-0.17	81320.00	105231.12
	ACRES (000)	-0.11	2140.00	2168.74
	YIELD/ACRE	-0.05	38.00	48.52
	COST/ACRE	-0.13		
CROP	WHEAT (BU)			
	PRODUCTION (000)	+0.28	287830.00	280689.87
	ACRES (000)	+0.28	11655.00	10143.05
	YIELD/ACRE	NIL	24.69	27.67
	COST/ACRE	-0.03		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	NIL	1102.77	3102.53
	ACRES (000)	NIL	147.00	261.74
	YIELD/ACRE	NIL	12.50	19.75
	COST/ACRE	-0.05		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+0.18	1584.00	1870.06
	ACRES (000)	NIL	1600.00	1735.23
	YIELD/ACRE	NIL	.98	1.07
	COST/ACRE	NIL		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	-0.97	1475.00	2094.28
	ACRES (000)	-1.33	295.00	315.31
	YIELD/ACRE	+0.36	5.00	6.64
	COST/ACRE	+0.12		
STATE	SOUTH DAKOTA	% CHANGE	1976 SRS	1985 NIRAP

CROP	CORN (BU)			
	PRODUCTION (000)	NIL	37200.00	114170.31
	ACRES (000)	NIL	1200.00	1855.91
	YIELD/ACRE	NIL	31.00	61.51
	COST/ACRE	-0.01		
CROP	SORGHUM (BU)			
	PRODUCTION (000)	NIL	3496.00	20418.47
	ACRES (000)	NIL	152.00	445.47
	YIELD/ACRE	NIL	23.00	45.83
	COST/ACRE	-0.13		
CROP	BARLEY (BU)			
	PRODUCTION (000)	+2.09	5950.00	21395.15
	ACRES (000)	+2.09	350.00	470.39
	YIELD/ACRE	NIL	17.00	45.48
	COST/ACRE	-0.11		
CROP	OATS (BU)			
	PRODUCTION (000)	-0.01	42600.00	94349.43
	ACRES (000)	-0.01	1420.00	1952.32
	YIELD/ACRE	NIL	30.00	48.32
	COST/ACRE	-0.01		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.05	2764.14	6815.25
	ACRES (000)	+0.06	271.00	494.88
	YIELD/ACRE	NIL	17.00	22.95
	COST/ACRE	-0.03		
CROP	L HAY (TONS)			
	PRODUCTION (000)	NIL	1840.00	4330.20
	ACRES (000)	NIL	2300.00	3152.40
	YIELD/ACRE	NIL	.79	1.37
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+0.25	1000.00	1991.89
	ACRES (000)	NIL	2000.00	2558.29
	YIELD/ACRE	NIL	.50	.77
	COST/ACRE	NIL		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	-0.76	3915.00	7871.59
	ACRES (000)	-1.18	1445.00	924.74
	YIELD/ACRE	+0.42	5.69	8.51
	COST/ACRE	+0.19		

STATE	NEBRASKA	% CHANGE	1976 SRS	1985 NIRAP
CROP	SORGHUM (BU)			

	PRODUCTION (000)	NIL	119700.00	140282.31
	ACRES (000)	NIL	2100.00	1935.46
	YIELD/ACRE	NIL	57.00	72.47
	COST/ACRE	NIL		
CROP	BARLEY (BU)			
	PRODUCTION (000)	+0.04	1368.00	1426.28
	ACRES (000)	+0.08	38.00	43.65
	YIELD/ACRE	-0.03	36.00	32.67
	COST/ACRE	-0.04		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	NIL	12359.75	23186.46
	ACRES (000)	NIL	1030.00	1286.09
	YIELD/ACRE	NIL	20.00	30.04
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	NIL	1828.00	2119.65
	ACRES (000)	NIL	2150.00	2905.77
	YIELD/ACRE	NIL	.85	.72
	COST/ACRE	NIL		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	-0.13	6900.00	8522.28
	ACRES (000)	-0.25	780.00	547.84
	YIELD/ACRE	+0.12	16.50	15.55
	COST/ACRE	+0.03		
STATE	VIRGINIA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	NIL	46740.00	48326.07
	ACRES (000)	NIL	615.00	569.37
	YIELD/ACRE	NIL	76.00	84.87
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-0.09	4895.30	6691.17
	ACRES (000)	-0.08	398.00	480.76
	YIELD/ACRE	-0.01	20.50	23.19
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+0.07	1081.00	1178.96
	ACRES (000)	+0.08	865.00	618.39
	YIELD/ACRE	NIL	1.24	1.90
	COST/ACRE	-0.01		
STATE	WEST VIRGINIA	% CHANGE	1976 SRS	1985 NIRAP

CROP	CORN (BU)			
	PRODUCTION (000)	-0.62	5368.00	5436.68
	ACRES (000)	-0.62	61.00	81.86
	YIELD/ACRE	NIL	88.00	66.41
	COST/ACRE	+0.08		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-3.50		
	ACRES (000)	-3.47		
	YIELD/ACRE	-0.03		
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+3.69	670.00	476.19
	ACRES (000)	+3.76	515.00	306.68
	YIELD/ACRE	-0.06	1.30	1.55
	COST/ACRE	-0.40		
STATE	KENTUCKY	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	-4.98	138720.00	90611.43
	ACRES (000)	-6.09	1360.00	1063.33
	YIELD/ACRE	+1.18	102.00	85.21
	COST/ACRE	-0.78		
CROP	BARLEY (BU)			
	PRODUCTION (000)	-2.19	1110.00	2377.18
	ACRES (000)	-1.85	30.00	45.39
	YIELD/ACRE	-0.33	37.00	52.36
	COST/ACRE	+0.99		
CROP	OATS (BU)			
	PRODUCTION (000)	+0.68	350.00	569.88
	ACRES (000)	+0.49	10.00	10.98
	YIELD/ACRE	+0.19	35.00	51.88
	COST/ACRE	+0.37		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-0.54	10230.00	8620.98
	ACRES (000)	-0.54	330.00	207.67
	YIELD/ACRE	NIL	31.00	41.51
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+5.48	17012.66	20683.73
	ACRES (000)	+4.98	1070.00	1062.41
	YIELD/ACRE	+0.47	26.50	32.44
	COST/ACRE	-0.22		
CROP	NL HAY (TONS)			

	PRODUCTION (000)	+9.59	2394.00	2293.71
	ACRES (000)	+9.82	1330.00	1065.81
	YIELD/ACRE	-0.21	1.79	2.15
	COST/ACRE	-0.36		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	NIL	2886.00	2931.98
	ACRES (000)	NIL	178.00	175.24
	YIELD/ACRE	NIL	29.04	16.73
	COST/ACRE	-0.06		
CROP	COTTON (BALES)			
	PRODUCTION (000)	-0.62	.69	2.55
	ACRES (000)	NIL	1.29	1.75
	YIELD/ACRE	-0.62	.53	1.45
	COST/ACRE	+0.30		
STATE	TENNESSEE	% CHANGE	1976 SRS	1985 NIRAP
CROP	BARLEY (BU)			
	PRODUCTION (000)	+88.25	532.00	665.59
	ACRES (000)	+88.25	14.00	16.77
	YIELD/ACRE	NIL	38.00	39.66
	COST/ACRE	-0.02		
CROP	OATS (BU)			
	PRODUCTION (000)	-12.03	1440.00	1154.18
	ACRES (000)	-13.97	32.00	23.16
	YIELD/ACRE	+2.25	45.00	49.81
	COST/ACRE	+1.25		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-0.54	12395.00	10594.38
	ACRES (000)	-0.54	335.00	276.56
	YIELD/ACRE	NIL	37.00	38.30
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-17.65	24299.51	25854.67
	ACRES (000)	-38.29	1800.00	1653.62
	YIELD/ACRE	+33.45	22.50	26.05
	COST/ACRE	-1.46		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	-11.05	1617.00	1492.46
	ACRES (000)	-12.79	1115.00	818.86
	YIELD/ACRE	+2.00	1.45	1.82
	COST/ACRE	+0.21		
CROP	SILAGE (TONS)			
	PRODUCTION (000)	NIL	2532.00	1971.38

	ACRES (000)	NIL	172.00	121.40
	YIELD/ACRE	NIL	26.00	16.23
	COST/ACRE	-0.05		
CROP	COTTON (BALES)			
	PRODUCTION (000)	+3.19	225.00	356.94
	ACRES (000)	+4.26	370.00	340.38
	YIELD/ACRE	-1.02	.60	1.04
	COST/ACRE	+0.29		
STATE	ALABAMA	% CHANGE	1976 SRS	1985 NIRAP
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-23.27	17567.65	20683.73
	ACRES (000)	-29.50	1220.00	1308.13
	YIELD/ACRE	+8.83	24.00	26.35
	COST/ACRE	-2.43		
STATE	MISSISSIPPI	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	+19.29	8084.00	6221.98
	ACRES (000)	+19.29	172.00	123.52
	YIELD/ACRE	NIL	47.00	50.37
	COST/ACRE	NIL		
CROP	OATS (BU)			
	PRODUCTION (000)	+16.14	966.00	2156.88
	ACRES (000)	+16.54	63.00	33.86
	YIELD/ACRE	-0.34	15.33	63.68
	COST/ACRE	-0.84		
CROP	WHEAT (BU)			
	PRODUCTION (000)	NIL	5220.00	6231.98
	ACRES (000)	NIL	180.00	178.74
	YIELD/ACRE	NIL	29.00	34.86
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.19	42899.15	41367.42
	ACRES (000)	+0.27	3250.00	2618.88
	YIELD/ACRE	-0.07	22.00	26.32
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	-0.36	1105.00	978.56
	ACRES (000)	-0.48	650.00	457.29
	YIELD/ACRE	+0.11	1.69	2.13
	COST/ACRE	-0.05		
CROP	COTTON (BALES)			

	PRODUCTION (000)	+4.54	1145.00	1710.75
	ACRES (000)	+6.93	1470.00	1388.12
	YIELD/ACRE	-2.23	.77	1.23
	COST/ACRE	-0.34		
STATE	ARKANSAS	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	-13.40	2520.00	1208.18
	ACRES (000)	-18.68	45.00	26.36
	YIELD/ACRE	+6.49	56.00	45.83
	COST/ACRE	-0.52		
CROP	OATS (BU)			
	PRODUCTION (000)	-5.76	5320.00	3570.78
	ACRES (000)	-3.83	70.00	46.84
	YIELD/ACRE	-2.00	76.00	76.22
	COST/ACRE	-1.24		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-0.94	27690.00	14541.38
	ACRES (000)	-0.95	710.00	385.67
	YIELD/ACRE	NIL	39.00	37.70
	COST/ACRE	NIL		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-0.53	46655.08	74461.37
	ACRES (000)	NIL	4320.00	4701.06
	YIELD/ACRE	-0.53	18.00	26.39
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+2.34	1088.00	1137.25
	ACRES (000)	+2.48	680.00	567.24
	YIELD/ACRE	-0.13	1.59	2.00
	COST/ACRE	-0.22		
CROP	COTTON (BALES)			
	PRODUCTION (000)	-0.55	780.00	1046.40
	ACRES (000)	NIL	950.00	1014.54
	YIELD/ACRE	-0.55	.82	1.03
	COST/ACRE	+0.29		
STATE	LOUISIANA	% CHANGE	1976 SRS	1985 NIRAP
CROP	CORN (BU)			
	PRODUCTION (000)	+19.25	5916.00	4228.48
	ACRES (000)	+19.27	87.00	92.54
	YIELD/ACRE	-0.01	68.00	45.68
	COST/ACRE	NIL		

CROP	OATS (BU)			
	PRODUCTION (000)	+18.32	480.00	1031.59
	ACRES (000)	+17.86	10.00	22.59
	YIELD/ACRE	+0.38	48.00	45.64
	COST/ACRE	-0.01		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-56.27	33071.34	32990.51
	ACRES (000)	NIL	2120.00	2147.48
	YIELD/ACRE	-56.27	26.00	25.60
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+0.53	688.00	737.29
	ACRES (000)	NIL	362.00	318.34
	YIELD/ACRE	+0.53	1.90	2.31
	COST/ACRE	NIL		
CROP	COTTON (BALES)			
	PRODUCTION (000)	-99.83	555.00	581.33
	ACRES (000)	-99.71	560.00	514.15
	YIELD/ACRE	-42.56	.99	1.13
	COST/ACRE	-51.38		

STATE	OKLAHOMA	% CHANGE	1976 SRS	1985 NIRAP
CROP	OATS (BU)			
	PRODUCTION (000)	-0.67	5940.00	3376.08
	ACRES (000)	-0.70	132.00	79.76
	YIELD/ACRE	+0.03	45.00	42.32
	COST/ACRE	+0.14		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-5.53	151200.00	175057.56
	ACRES (000)	-5.90	6300.00	5563.51
	YIELD/ACRE	+0.38	24.00	31.46
	COST/ACRE	-0.18		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	-10.54	3167.93	4560.74
	ACRES (000)	NIL	240.00	311.46
	YIELD/ACRE	-10.54	22.00	24.40
	COST/ACRE	NIL		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	-0.21	1827.00	1828.58
	ACRES (000)	NIL	1260.00	1367.15
	YIELD/ACRE	-0.21	1.44	1.33
	COST/ACRE	NIL		
CROP	COTTON (BALES)			

	PRODUCTION (000)	-16.47	175.00	230.20
	ACRES (000)	-15.94	335.00	324.66
	YIELD/ACRE	-0.63	.52	.70
	COST/ACRE	+3.91		
STATE	TEXAS	% CHANGE	1976 SRS	1985 NIRAP
CROP	SORGHUM (BU)			
	PRODUCTION (000)	+0.76	292900.00	463120.62
	ACRES (000)	NIL	5800.00	8725.78
	YIELD/ACRE	+0.76	50.50	53.07
	COST/ACRE	+0.76		
CROP	OATS (BU)			
	PRODUCTION (000)	-0.24	14430.00	19491.67
	ACRES (000)	+0.04	390.00	542.47
	YIELD/ACRE	-0.29	37.00	35.93
	COST/ACRE	+0.12		
CROP	WHEAT (BU)			
	PRODUCTION (000)	-4.09	103400.00	91943.06
	ACRES (000)	-4.68	4700.00	3212.63
	YIELD/ACRE	+0.61	22.00	28.61
	COST/ACRE	-0.81		
CROP	SOYBEANS (CWT)			
	PRODUCTION (000)	+0.47	5413.08	6205.13
	ACRES (000)	-0.38	347.00	291.72
	YIELD/ACRE	+0.86	26.00	35.45
	COST/ACRE	NIL		
CROP	L HAY (TONS)			
	PRODUCTION (000)	NIL	1080.00	864.60
	ACRES (000)	+1.68	200.00	231.02
	YIELD/ACRE	-1.65	5.39	3.74
	COST/ACRE	+0.11		
CROP	NL HAY (TONS)			
	PRODUCTION (000)	+0.02	4290.00	3959.68
	ACRES (000)	NIL	1950.00	2368.05
	YIELD/ACRE	+0.02	2.19	1.67
	COST/ACRE	NIL		
CROP	COTTON (BALES)			
	PRODUCTION (000)	+1.14	3307.00	3587.54
	ACRES (000)	+0.93	4500.00	3831.87
	YIELD/ACRE	+0.20	.73	.93
	COST/ACRE	+3.17		
STATE	NEW MEXICO	% CHANGE	1976 SRS	1985 NIRAP

```
CROP   SORGHUM (BU)
       PRODUCTION (000)   -23.11     11940.00     20008.07
       ACRES (000)        -23.78       199.00       350.14
       YIELD/ACRE          +0.88        60.00        57.14
       COST/ACRE          +15.82

CROP   NL HAY (TONS)
       PRODUCTION (000)    -0.11        80.00       128.49
       ACRES (000)           NIL        67.00        64.24
       YIELD/ACRE          -0.11         1.19         2.00
       COST/ACRE             NIL

CROP   COTTON (BALES)
       PRODUCTION (000) +176.29         76.00       156.96
       ACRES (000)      +171.13         70.00       142.91
       YIELD/ACRE         +1.90          1.08         1.09
       COST/ACRE          +0.15


STATE  CALIFORNIA         % CHANGE    1976 SRS   1985 NIRAP
CROP   CORN (BU)
       PRODUCTION (000)    +0.41     31900.00     31774.35
       ACRES (000)         +0.41       290.00       259.66
       YIELD/ACRE            NIL       110.00       122.36
       COST/ACRE             NIL

CROP   SORGHUM (BU)
       PRODUCTION (000)    -1.27     14910.00     22573.15
       ACRES (000)         -1.27       210.00       283.48
       YIELD/ACRE            NIL        71.00        79.62
       COST/ACRE             NIL



THAT'S ALL FOLKS....

GLAD TO BE OF SERVICE
WE'LL PRINT THIS OUTPUT AND SIGN OFF!!!

JOB  825 EH72STP6 AWAITING FET  5  0 PRIO  6

JOB  825 EH72STP6 AWAITING OUT  5  0 PRIO  6

UNIT/COST  ELAPSED 00:19:10/$0.58, CPU 2.92 SECS/$0.29
UNIT/COST  PAGE 18.33 HRS/$1.98, DISK 4/$0.00
WYLBUR TOTAL  $2.85
ELAPSED TIME = 00:19:20
END OF SESSION
```

APPENDIX

ISU COMPUTATION CENTER

User's Reference Memo

Classification TIMESHARE 05 URM 039

Title Login Procedure for ISU Time Sharing

Last Verified August 1977

Summary

This URM contains a description of the login procedures required to use time-sharing services at ISU. This document applies to both time-sharing systems: CPS and WYLBUR. Both systems login through the same terminal monitor, MILTEN.

Login Procedure for ISU Time Sharing

1. Initial Login to Time Sharing

The login procedure requires the following information from the user:

a) Terminal characteristics
b) Account number
c) User name
d) Account key
e) Time-sharing system desired

The user provides the above information in a series of interactions with the terminal monitor, MILTEN. The first interaction occurs immediately upon connecting through the phone line to MILTEN. The first characters transmitted to the system must be the characteristics of the terminal being used. These characteristics are:

a) Line speed
b) Terminal type

Users of 2741-compatible terminals enter terminal characteristics by doing a carriage return immediately after making phone connection with MILTEN.

Users of Teletype-compatible terminals enter terminal characteristics in the following format:

x,type

where:

x — is a required valid line speed recognition character as described in Figure 1.

, — is required as shown if a terminal type code is supplied.

type — is a valid terminal type code. The valid

terminal codes are CPS, CLF, DEC, TTY, TLF, and 2500. A description of the terminal type codes is in Figure 2. If the line speed character is terminated with a CTRL-S, and the type code is not entered, the system will default to terminal type code TTY. If the line speed is terminated with a CR, the system will default to terminal type code DEC.

After succesfully entering the terminal characteristics, MILTEN produces a greeting message containing the line number being used, the current time, and the date. For example:

```
ISU LINE 14 12:40:35 02/14/77
```

At the completion of the greeting message an informative message may be printed. For example:

```
*** ALL TIME-SHARING USE WILL BE FREE TODAY ***
```

Following the greeting line or message, MILTEN prompts for the information required for billing purposes. The information required is account number, user name, and account key. This interaction has the following form:

```
ACCOUNT? u9999,username
KEY? ky
```

where:

ACCOUNT? is a prompt from MILTEN requesting the billing information.

u9999 is the account number to which the terminal session is to be charged.

, is required if 'username' is specified.

username is the name to be associated with the terminal session. If 'username' is not supplied as part of the response to MILTEN's 'ACCOUNT? ' prompt, MILTEN will prompt with 'NAME? ', and the user must enter a 'username' in response.

KEY? is MILTEN's prompt for the user's account key.

ky is the account key for the account being used. If the key is in upper case, it must be entered in upper case. If the account doesn't have a key, the user must respond with just a carriage return or CNTRL-S.

Users should be aware that keys other than normal alphanumeric characters may not be interpreted in the same way by different terminal types.

After the preceding interaction, MILTEN prompts:

SYSTEM?

The user responds with either 'CPS' or 'WYLBUR'.

2. Logging into CPS

If the user has responded to MILTEN's 'SYSTEM?' prompt with 'CPS', his further interaction will continue as:

FILEID,PROCESSOR?
fileid,processor

where:

FILEID, PROCESSOR	is the request for the names of the CPS load/save files and CPS processor the user wishes to use.
fileid	is the name of the load/save file the user will use.
,	is required if a processor is specified.
processor	is the CPS processor the user will use. Available processors are RJE, BASIC, and CPS. CPS is the default processor. This specification is optional. Other parameters may optionally be specified after processor. These include the autosave file name and its protection key. They are documented in the IBM CPS Terminal User's Manual.

3. Logging into WYLBUR

If the user has responded 'WYLBUR' to MILTEN's 'SYSTEM?' prompt, his further interaction will continue as:

COMMAND?

The user responds with a WYLBUR command.

4. Switching Between WYLBUR and CPS

Two MILTEN commands, 'WYLBUR' and 'CPS', enable the user to switch during a session from one system to another. A WYLBUR user may switch to CPS by responding:

```
COMMAND?  cps
```

where:

COMMAND?	is WYLBUR's prompt for a command
cps	is a MILTEN command the user issues to indicate he wants to use CPS.

The previous interaction means that the user is transferred from WYLBUR into CPS. The user is still logged in to WYLBUR, so he will still be charged for any pages of active or execute files which he is using during the current terminal session. If this is the first time the user is entering CPS during this terminal session, he must next respond to the prompt for fileid and processor. If the user has previously used CPS during the current session, he will not be prompted for fileid and processor.

A CPS user may switch to WYLBUR by using the 'WYLBUR' command. A greater-than character (>) must be typed as the first character of the response containing the word 'WYLBUR':

```
?>wylbur
```

where:

?	is a CPS prompt for a command.
>wylbur	is the CPS user's response indicating he wants to use WYLBUR.

The previous interaction transfers the user out of CPS and into WYLBUR. The user is still logged in to CPS, so he will still be charged for any CPS program pages which he is using during the current terminal session. He will next be prompted for a WYLBUR command, by either 'COMMAND?' or '?'.

O - to specify 30 characters per second*
S - to specify 10 characters per second

* "O" is a letter, not the numeric zero.

Figure 1. Line Speed Recognition Characters

TTY	Teletypes 33, 35, 37, 38
TLF	Teletypes with automatic line feed feature
DEC	DECWRITER II
CPS	Teletypes with character set support for CPS
CLF	Teletypes with automatic line feed feature and CPS character set support
2500	DATAMEDIA 2500

NOTE: URM 047, "Code Tables for Time-sharing Terminals at ISU," contains a table showing the character set available for each terminal type.

Figure 2. Terminal Type Codes

		TTY or TLF		DECWRITER		CPS or CLF		DATAMEDIA 2500	
CHARACTER STORED	HEX VALUE	KEYSTROKE* ENTERED	CHAR. PRINTED	KEYSTROKE* ENTERED	CHAR. PRINTED	KEYSTROKE* ENTERED	CHAR. PRINTED	KEYSTROKE* ENTERED	CHAR. PRINTED
0-8-2	E0	\ SHIFT-L	\	\	\	\ SHIFT-L	\	\	\
¢	4A	↑ SHIFT-N	↑	^	^	SHIFT-K	[	↑	↑
underscore	6D	← SHIFT-O	←	_	_	CTRL-SHIFT-O	none	←	←
| "OR"	4F	¦ CTRL-W	!	¦	¦	¦ ¦	! !	¦	¦
¬ "NOT"	5F	~ CTRL-C CTRL-N	]	~	~	]	]	~	~
!	5A	!	!	!	!	CTRL-SHIFT-L	!	!	!
CR carriage return		CTRL-S	none	RETURN** CTRL-S	none	RETURN** CTRL-S	none	RETURN** CTRL-S	none
ATTENTION		CTRL-Q BREAK	*** ...	CTRL-Q BREAK	*** ...	CTRL-Q BREAK	*** ...	CTRL-Q BREAK	*** ...
BACKSPACE		CTRL-H CTRL-X	none	BACKSPACE KEY	none	CTRL-H	none	BACKSPACE KEY	none
TAB		CTRL-I	none	TAB KEY	none	CTRL-I	none	TAB KEY	none

*Keystroke refers to striking one or more than one key simultaneously.
**Use RETURN at 300 baud or above, and CTRL-S at 110 baud.

Note. The IBM 2741 typewriter terminal has keys for all of the special characters except the 0-8-2 (as used in THESIS, for example). There is no equivalent keystroke for it. See URM 046, "Using WYLBUR and THESIS 3.5 for Text Editing," for a means of coping with the situation.